PERFORMANCE WORK STATEMENT
STREAMS III
TASK ORDER ___

TITLE: Complete Third Phase of Ongoing Ground Water Investigation for the San Mateo Creek Basin Legacy Uranium Site, New Mexico

Task Order Manager (TOM)	**Alternate Task Order Manager (ATOM)**
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PERIOD OF PERFORMANCE:

The Period of Performance shall begin upon task order award and end twenty-four (24) months later. During this period, the third and final phase of an ongoing ground water investigation will be completed.

BACKGROUND

TASKS

Task 1 Review Existing Data and Technical Reports and Provide a Proposal for Completing Phase 3 of Ground Water Investigation

The contractor shall review and evaluate existing data and technical reports on the first two phases of the EPA ground water investigation (Phase 1 and 2) and provide a proposal and budget to the EPA TOM for completion of Phase 3, which shall include identification of existing data gaps in the ongoing investigation and the development of a ground water Conceptual Site Model (CSM). The CSM shall be a dynamic CSM related to the hydrogeology, geochemistry and ground water flow systems for evaluating spatial, temporal and vertical extent of water quality impacts caused by legacy uranium mining related contamination on a basin-wide scale. The historic and recent data collected as part of Phase 1 and 2 shall be summarized to demonstrate that the CSM has evolved over time. The CSM may include modeling efforts such as analytical models (e.g., mass loading, concentration changes), numerical flow models (e.g., MODFLOW), geochemical models (WATEQ, PHREEQ, MINTEQ), and possibly vadose zone models (HYDRUS). Such modeling would need to be on a scale that would be manageable for the

objectives of this investigation. The proposal shall also include a project schedule. The work under this subtask shall include a review of the EPA 2016 Phase 1 Ground Water Report, prepared by the EPA's prior contractor, Weston Solutions, Inc. (Weston), and the ground water data collected by Weston as part of Phase 2. The reports and data sets will include borehole geological data and geophysical logs, ground water sampling results, geochemical analysis, and subsurface hydrogeological maps and cross sections. The work shall also include a review of other historical reports and data, including:

- New Mexico Environment Department (NMED) 2010 draft Geochemical Analysis of Ground Water Data Collect for the former Anaconda Bluewater Uranium Mill and San Mateo Creek Basin Legacy Uranium sites,
- NMED 2012 Phase 2 Site Inspection Report for the San Mateo Creek Basin Legacy Uranium Mine and Mill Site Area,
- NMED 2015 Site Reassessment Report for the Lower San Mateo Creek Basin, and
- U.S. Department of Energy - Legacy Management's 2014 Site Status Report: Groundwater Flow and Contaminant Transport in the Vicinity of the Bluewater, New Mexico, Disposal Site (LMSBLU/S11381).

One to two weeks after the proposal and budget for the Phase 3 ground water investigation has been submitted to the EPA, the contractor shall set up a conference call with the project team members to discuss the data review and proposal.

Task 1 – Deliverable 1: Phase 3 Ground Water Investigation Proposal due to the EPA TOM two months after Task Order award.

Task 1 – Deliverable 2: Schedule conference call one to two weeks after proposal delivery.

Task 2 Identify Data Gaps and Develop Plans for Collecting Additional Data

The contractor shall identify any data gaps which need to be filled to complete the Phase 3 ground water investigation, including the Conceptual Site Model. If data gaps are identified, the contractor shall notify the EPA TOM and discuss the need for additional data collection via a meeting or teleconference. If EPA is in agreement, the contractor shall develop a draft Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) for collecting the additional data. The QAPP must require that the analytical laboratories results achieve anion/cation balance as a specification. The contractor shall provide the draft SAP and QAPP to the EPA TOM for review and approval. The contractor shall also prepare a Health and Safety Plan (HSP) and submit it to the EPA TOM for review. The additional data to be collected may include additional borehole drilling and monitoring well construction activities, ground water sampling and analysis, geophysical well logging of private water wells (including pulling the pumps to log the well), and seismic surveys.

Task 2 – Deliverable 1: Schedule conference call with EPA to discuss data gaps

Task 2 – Deliverable 2: Sampling and Analysis Plan

Task 2 – Deliverable 3: Quality Assurance Project Plan

Task 2 – Deliverable 4: Health and Safety Plan

Task 3 Conduct Field Investigation and Data Collection

If additional data collection is necessary, the contractor shall complete one or more of the subtasks defined below. Once the draft SAP is approved by EPA, the contractor shall implement the SAP or portions thereof, in accordance with the approved QAPP. The contractor shall assist EPA in obtaining access agreements from property owners for permission to access land for drilling, geophysical logging or surveying, and sampling. The contractor shall mobilize and demobilize field crews and equipment to the San Mateo Creek Basin Legacy Uranium site specified in this PWS. The contractor shall have representatives in the field for all field work conducted by subcontractors.

Subtask 3.1 Borehole Drilling, Geophysical Logging, and Well Construction

The contractor shall file the necessary drilling applications with the New Mexico Office of the State Engineer (OSE) and obtain the required drilling permits. The contractor shall procure drilling and geophysical logging services with experience in drilling and logging the bedrock formations anticipated to be encountered in the San Mateo Creek basin area and construction and development of ground water monitoring wells. The contractor shall implement the drilling and geophysical logging program as set forth in the approved SAP. The contractor shall have a geologist present at the drill site while drilling operations are ongoing for logging the borehole, including examining the drill cuttings or cores and identifying geologic formation tops and any saturation or water-bearing zones. Daily drilling reports shall be prepared and provided to the EPA TOM. The daily drilling reports shall include photographs of field activities and drill cuttings/cores, as appropriate. The contractor's geologist shall prepare a geologic boring log for each borehole drilled. The contractor's field representative shall be available to discuss the status of drilling with the EPA TOM on a daily basis via telephone. For each borehole that encounters formation water, the contractor shall construct a monitoring well using PVC casing and 10- or 20-foot screens at lowest portion of saturation zone, as appropriate. The contractor shall prepare well construction diagrams for each monitoring well installed. After the drilling and well construction program is completed, the contractor shall have each boring and monitoring well ground surface elevation and top of casing elevation (for the wells) recorded by a land surveyor. The total number of shallow alluvial boreholes to be drilled is estimated at 12. The average depth of the alluvial borehole is estimated at 80 feet. The total number of bedrock wells to be drilled is estimated at five. Three (3) of the bedrock wells would be drilled to the

Dakota Sandstone to depths of approximately 400 feet. The remaining two (2) bedrock wells would be drilled to the San Andres Limestone/Glorietta Sandstone or the Chinle Formation to depths of approximately 700 feet. For the bedrock wells, shallow and intermediate casing strings may be required to seal off water-bearing zones in the alluvium or shallower bedrock formations.

Subtask 3.1 – Deliverable 1: Obtain OSE Drilling Permits for all planned boreholes.

Subtask 3.1 – Deliverable 2: Drill alluvial and bedrock boreholes and construct monitoring wells where formation water is encountered.

Subtask 3.1 – Deliverable 3: Collect sediment core samples from base of alluvium at select drilling locations and ship sediment samples to designated analytical laboratory. Management, shipment and tracking of sediment samples.

Subtask 3.1 – Deliverable 4: Conduct geophysical well logging in all bedrock boreholes and provide the 2-inch and 5-inch logs to the EPA TOM.

Subtask 3.1 – Deliverable 5: Prepare geologic boring logs for all boreholes drilled and provide to EPA TOM.

Subtask 3.1 – Deliverable 6: Prepare well construction diagrams for all new ground water monitoring wells and provide to EPA TOM.

Subtask 3.1 – Deliverable 7: Survey ground surface elevation and top of casing elevation for all wells constructed. Also survey ground surface elevation for all other boreholes drilled. Record elevation measurements on header of geophysical well logs and geologic boring logs.

Subtask 3.2 Geophysical Logging of Private Water Wells

The contractor shall run geophysical well logging tools down the wellbore at select private water wells within the San Mateo Creek basin to obtain additional geologic information needed for the ground water investigation. The contractor will assist EPA in obtaining permission from the well owners to log the wells and access agreements for entering the properties if necessary. The contractor shall also coordinate with the well owner and drilling subcontractor to pull the well pump prior to running the logging tools and reset the pump after logging the well. Any needed restoration of the site shall be performed by the contractor after resetting the pump. A total of 10 private wells is estimated for this subtask.

Subtask 3.2 – Deliverable 1: Conduct geophysical well logging in private water wells and provide the 2-inch and 5-inch logs to the EPA TOM.

Subtask 3.3 Field Sampling

The contractor shall collect ground water samples and sediment samples in accordance with the approve SAP and QAPP and ship the samples to designated laboratories for analysis. Field crews shall be responsible for the development of the monitoring wells, collection of field samples, measurement of static water levels and other field parameters, shipping sample bottles and completed chain-of-custody forms needed to transport samples to the contractor's designated analytical laboratory(ies), and documenting all field activities in a field log book. Alluvial sediment samples may be collected at some drilling locations during borehole advancement and coring and shipped to a laboratory for Scanning Electron Microscopy (SEM) and laboratory leaching (SLPL). The sediment samples will be collected at the base of the alluvium. The contractor shall submit the field log book to the EPA when the final Phase 3 ground water report is submitted. It is estimated that ground water samples will be collected from approximately EPA 20 monitoring wells, 10 private water wells, and five industry monitoring wells as part of the Phase 3 investigation. A total of 10 alluvial sediment samples are estimated to be collected during borehole drilling.

Subtask 3.3 – Deliverable 1:	Collection of approximately 35 ground water samples. Management, shipment and tracking of ground water samples.
Subtask 3.3 – Deliverable 2:	Collection of approximately 10 alluvial sediment core samples. Management, shipment and tracking of sediment samples.

Subtask 3.4 Procurement of Analytical Laboratories

The contractor shall be responsible for procuring analytical laboratories for performing sample analysis. Ground water samples will be analyzed for the following:

- Field parameters (water temperature, pH, conductance, turbidity, oxygen redox potential (ORP) and dissolved oxygen (DO)),
- Dissolved ferrous iron,
- DO,
- Alkalinity,
- Total organic carbon,
- Major anions and cations,
- Trace elements (including molybdenum and selenium),
- Nitrogen,
- Uranium isotopes,
- Gross alpha/beta,
- Stable isotopes,

- Sulfur isotopes,
- Carbon isotopes (including carbon-14), and
- Tritium/helium-3 for age dating.

If sediment core samples are collected, they shall be analyzed using SEM and laboratory leaching procedures to identify if uranium and other contaminants of concern (COCs) have coated or adsorbed onto the sedimentary grains during the desaturation of the alluvium and if the COCs can be returned to the dissolved or mobilized state when re-saturated.

Subtask 3.4 – Deliverable 1 — Procurement of analytical laboratories for analysis of ground water and sediment samples.

Subtask 3.4 – Deliverable 2: — Data validation of laboratory analytical results. Verification that laboratory analytical results achieve anion/cation balance.

Subtask 3.5 Seismic Surveys

Several seismic surveys performed as part of Phase 1 met with limited success. The objective of the surveys was to identify alluvial paleo channels to support the siting of drilling locations to locate ground water in the deepest part of the channel. Additionally, the U.S. Geological Survey (USGS) conducted a seismic survey north of the Homestake Mining Company Uranium Mill NPL site to identify the San Mateo Fault Zone. Seismic surveys may still be appropriate to delineate the location of the San Mateo Fault Zone that traverses through the middle of the basin and support the siting of future bedrock drilling locations along/near the fault zone. Up to three seismic surveys shall be planned and conducted if so directed by EPA. The seismic lines shall be aligned perpendicular to the fault zone (east-west orientation) at key locations in the basin and be in close proximity to existing bedrock wells, where feasible, for correlation to bedrock formations. The contractor shall review the previous seismic data collected by the USGS and EPA to assess the usefulness of performing this subtask and the survey parameters that may be the most appropriate to achieve the objective based on the previous surveys.

Subtask 3.5 – Deliverable 1: — Seismic lines trending east-west across the San Mateo Fault Zone at 2-3 locations within the San Mateo Creek basin that are in close proximity to existing wells where the bedrock formation depths are known. The proximity to bedrock wells may allow the correlation of seismic signals to bedrock formations.

Task 4 Hydrogeological and Geochemical Assessment

The contractor shall perform a hydrogeological and geochemical assessment of the San Mateo Creek basin utilizing the historical and recent data collected by EPA during the Phase 1 and

Phase 2 components of the ground water investigation as well as any new data collected as part of Phase 3. The contractor shall incorporate and update the work presented in the Phase 1 ground water report as well as the geochemical graphs, plots and diagrams prepared as part of the Phase 2 geochemical assessment. The scope of this work is presented in the following subtasks.

Subtask 4.1 Hydrogeological Mapping

Perform contour mapping of ground water aquifer water levels or potentiometric surfaces, saturation thickness, and concentration of contaminants of concern (COCs) along the primary flow paths of interest. This shall include mapping of the alluvial aquifer or saturation as it represents the primary pathway for transporting mine discharge water from the uranium mine dewatering operations to various parts of the San Mateo Creek basin. This shall also include mapping of the Dakota Sandstone Aquifer and possible other bedrock aquifers if sufficient data are available. Perform contour mapping of the base of the alluvium and/or key bedrock formations structure tops, including faulting, along the flow paths of interest utilizing geophysical well logs, boring logs, and seismic surveys as appropriate. Construct key hydrogeological cross sections or fence diagrams to support mapping efforts. Some of these maps have been prepared for the Phase 1 and Phase 2 components of the ground water investigation. They should be updated to reflect any new data collected as part of Phase 3.

Subtask 4.1 – Deliverable 1: Maps and cross sections that are to be incorporated into the Phase 3 Ground Water Report, including isoconcentration contour maps of uranium and selenium in alluvial ground water, alluvial saturated thickness map, alluvial ground water flow maps, alluvial thickness map, Dakota Sandstone aquifer saturation map, and multiple geologic cross sections oriented parallel to and perpendicular to the dip of the bedrock formations.

Subtask 4.2 Update of Geochemical Analysis

The Phase 2 ground water investigation included a geochemical analysis of the ground water data. Various graphs, plots and diagrams were completed as part of Phase 2 and will be presented in the Phase 2 ground water report which is scheduled to be completed in the summer of 2017. They include stiff diagrams, tri-linear diagrams (piper diagrams), and various charts, graphs, and plots of chemical and isotopic parameters and radiochemistry data, including uranium versus uranium activity ratios and stable and sulfur isotope charts. These displays were created to identify spatial and unique chemical signatures of the alluvial and bedrock formation waters. The contractor shall update these diagrams, charts, plots and graphs with any new chemical data collected as part of the Phase 3 ground water investigation and finalize the geochemical analysis.

Subtask 4.2 – Deliverable 1: Updated geochemical diagrams, charts, plots and graphs and incorporate them and the final geochemical analysis into the Phase 3 ground water report.

Task 5 Ground Water Conceptual Site Model

The contractor shall continue development of a dynamic conceptual site model (CSM) for the Phase 3 ground water investigation, utilizing existing data and state of knowledge of the San Mateo Creek drainage basin in a mostly quantitative-semi-quantitative fashion. The dynamic CSM reflects temporal changes in the basin's response to massive volumes (billions of gallons) of mine water that were discharged to surface drainages and infiltrated the alluvium and bedrock formations beginning in the late 1950s to about the early 1980s. This saturation event was followed by a draining out or desaturation of the alluvium in the upper and central portions of the drainage basin. As part of this effort, historical and recent data will be summarized in logs, maps, cross-sections, diagrams, charts and graphs of various types to demonstrate that the dynamic CSM has evolved. The CSM will be represented by these visual displays of data and fine-tuned, including the geochemical relationships. The CSM will need to show the temporal impacts by assessing (1) the degree of alluvial saturation and its water chemistry within the basin prior to uranium mine water discharge operations, (2) the degree of alluvial saturation and its water chemistry during the peak mine water discharge period (about 1977), and (3) the degree of alluvial saturation and its water chemistry present in the basin today.

Following the completion of Phase 1 and Phase 2 of the ground water investigation, the CSM has evolved to a level where it is now appropriate to "numericalize" the data in a comprehensive database that can be used to support modeling. Such modeling may include analytical models (equations like mass loading, concentration changes); numerical flow models (e.g., MODFLOW); geochemical models (e.g., WATEQ, PHREEQ, MINTEQ); and possibly vadose zone models (e.g., HYDRUS). The scope of modeling for the basin cannot be too large to be unwieldly or unreliable, but must be of an appropriate scale that focuses on the overall needs of key stakeholders such as the Navajo and the Laguna and Acoma Pueblo, the local communities, regional water planners and regulatory decision-makers.

Task 5 – Deliverable 1: Modeling results to be submitted to the EPA TOM for review and comment.

Task 5 – Deliverable 2: Technical meeting to discuss modeling results and any EPA comments as well as overall CSM. Meeting to be held within one month following receipts of EPA comments.

Task 5 – Deliverable 3: Revised modeling results to be submitted to the EPA TOM that incorporates all EPA comments. The results shall be submitted within one month following receipt of EPA comments.

Task 5 – Deliverable 4: Draft CSM with supporting figures and any modeling shall be included in the draft Phase 3 ground water report to be submitted under Task 6.

Task 6 Report Preparation

The contractor shall prepare a draft Phase 3 ground water report that presents the CSM for the San Mateo Creek basin and includes an interpretation of the hydrogeologic structure, geochemistry and ground water flow paths and predictive contaminant transport for the basin. The CSM shall be supported by the various logs, maps, cross sections, diagrams, charts, and graphs as well as any modeling performed. The report will also summarize the Phase 3 work performed and include summary data tables for the analytical results. The report will include a table of contents, executive summary and a conclusions section. The draft Phase 3 report will be submitted to the EPA TOM for review and comment. A final Phase 3 report that incorporates all EPA comments shall be submitted to the EPA TOM. The contractor will coordinate and communicate with the EPA TOM while revising the draft and draft final Phase 3 reports. This shall include teleconferences with EPA as directed by the EPA TOM.

Task 6 – Deliverable 1: Draft Phase 3 ground water report within three (3) months of receipt of all Phase 3 laboratory analytical data and submittal of revised modeling results to EPA TOM

Task 6 – Deliverable 2: Draft final Phase 3 ground water report within one month of receipt of EPA comments.

Task 6 – Deliverable 3: Final Phase 3 ground water report within one month of receipt of EPA comments.

Task 7 Technical and Stakeholder Meetings

The contractor may be requested to participate in technical meetings with EPA as necessary to discuss the work set forth under Tasks 1 – 6 above. The contractor may also be requested to attend stakeholder meetings to present the findings of the final Phase 3 report once it has been released to the public or to answer questions about the report. It is assumed that there will be three technical meetings with EPA to be held at the Regional Office in Dallas, TX. Two of these meetings will be with EPA Region 6 during performance of Phase 3. The third meeting will be with EPA Region 6 and Region 9 in Dallas to present the findings of the final Phase 3 report. It is also assumed that there will be two sets of stakeholder meetings to be held in New Mexico. The first set of stakeholder meetings will be held in the area of Grants, NM, to present the Phase 3 report findings to the local communities, and the Laguna and Acoma Pueblo Tribes. The second set of stakeholder meetings will be held in Albuquerque, NM, to present the Phase 3

report findings to the Navajo Nation and the New Mexico Environment Department (NMED) and Energy, Minerals and Natural Resources Department (EMNRD).

Task 7 – Deliverable 1: Participate in three technical meetings with EPA in Dallas, TX.

Task 7 – Deliverable 2: Participate in several EPA-Stakeholder Meetings in area of Grants, NM. It is estimated that one trip to NM will be adequate for all meetings.

Task 7 – Deliverable 3: Participate in EPA-Stakeholder Meetings in Albuquerque, NM. It is anticipated that one trip to New Mexico will be adequate for all meetings.

MANAGEMENT OF GEOSPATIAL DATA

Whenever practical, data collected for this project shall adhere to the National Geospatial Data Policy (NGDP), which establishes principles, responsibilities, and requirements for collecting and managing geospatial data used by Federal environmental programs and projects within the jurisdiction of EPA. This Policy also establishes the requirement of collecting and managing geospatial metadata describing the EPA's geospatial assets to underscore EPA's commitment to data sharing, promoting secondary data use, and supporting the National Spatial Data Infrastructure (NSDI).

DOCUMENT DISTRIBUTION

The contractor shall prepare electronic copies

QUALITY ASSURANCE REQUIREMENTS

All work shall be performed in accordance with the contractor's Quality Management Plan (QMP) through 48 CFR 46.